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ABSTRACT

Part of a collection of papers commissioned by Foundations, a project designed to identify the career development needs of students entering the National Technical Institute for the Deaf, this paper examines research on problem solving and decision making. The section on problem solving reviews various models and concepts associated with problem solving and considers the implications for training that follow from the past experience and the perception perspectives. The section on decision making describes normative, descriptive, dynamic, and conflict models. Three different defensive coping patterns are described (indifference, hypervigilance, and defensive avoidance), each linked to a set of antecedent conditions and a set of behavioral consequences. Suggestions for interventions that can provide assistance and support to students as they make decisions related to vocational choices are presented; they center on changing the perceptions and beliefs internal to the decisionmaker and/or modifying the external environment. Eleven general guidelines are offered, including examination of the ways in which individual differences relate to vocational decision making. (CL)

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Problem Solving and Decision Making:

A Review of the Literature

Michael Steve

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C. C. Cannonball was concerned. In his trucking business, time was money and he had spent too much of each the last time he road Interstate 77 through the mountains of Virginia. He recalled a shortcut he had heard about and decided he would try it out. So he turned off Interstate 81 onto VA 230 and headed south toward the Blue Ridge Mountains. Though the road was narrow and the curves tight, all went well for the first 50 miles. Then the headlights of his rig flashed upon a warning--UNDERPASS AHEAD : 14 FOOT LIMIT. C. C. Cannonball stopped his 14 foot 1 inch rig and sized up his dilemma. Though first resigned that he must head back the way he came, he decided to think about the situation a bit more. Fifteen minutes later, his now 13 foot 11 1/2 inch rig road slowly through the underpass, all of its tires nearly flat. He soon found a service station, filled his tires, and sped along VA 230 toward Greensboro.

Our lives are filled with situations which require attention in order to maintain an adequate level of functioning and growth. The process of finding and taking some action to deal with a situation has been alternately described as problem solving and decision making. Depending upon the consequences of one's action and the complexity of the situation, problem solving and decision making can range from crucial to mundane. And the individual's emotional reactions to success or failure may well be extreme in crucial matters but detached indifference in non-critical situations.

The goal in decision and problem situations can be described as arriving at a course of action which is the most satisfactory or at least one that does the job. The process of solving problems and making sound decisions can be differentiated, however. Gagne (1970) states that problem solving may be viewed as "...a process by which the learner discovers a combination of previously learned rules that he can apply to achieve a

solution for a novel problem situation." Skinner (1966) suggests the following definition, "A question for which there is at the moment no answer is a problem." Davis (1973), in his excellent review on the subject, proposes a more general definition than Skinner's, i.e., a problem is "...a stimulus situation for which an organism does not have a ready response" C. C. Cannonball was faced with a problem when he met the bridge built too close to the road beneath it. The situation presented itself as a problem, i.e., a dilemma for which he had no ready response. He found a successful solution.

Maier (1968) suggests that in decision situations, the alternatives are given and the task facing the individual is one of selecting the best alternative. Viewing decision making in terms of a choice situation has been widely accepted in such diverse areas as counseling, management science and education. C. C. Cannonball considered two alternative routes each having positive and negative consequences, known and unknown. His choice (decision) was made based on available information.

Th soundness of a decision unlike a solution to a problem is oftentimes difficult to evaluate. In C. C. Cannonball's case there were many criteria associated with each alternative route--time, money, wear-and-tear on his rig, wear-and-tear on C. C. Cannonball. The multitude of criteria associated with decisions and the imperfect knowledge the decision maker has about the consequences of each makes the soundness of the decision difficult if not impossible to realistically appraise both for the decision maker and for an outside observer. In contrast, inherent to the problem situation is the criterion of success, i.e., "Was the problem solved?".

While there are differences between problem solving and decision making, they are often interrelated. For example, as in C. C. Cannon ball's case, a problem situation evolved out of a decision. D'Zurilla and Goldfried (1971) outline another reasonable relationship. In their five stage problem solving model, they include a decision making step. Individuals who generate or discover multiple responses to problem situations then face a decision making situation. Thus, C. C. Cannonball, even though he found a way to proceed along VA 230, was faced with the decision of whether to implement that solution (and bear the consequences of riding on flattened tires) or to turn back (and among other things lose valuable time).

Together Figures 1 and 2 summarize many of the conceptual similarities and differences between problem solving and decision making. As is shown

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Insert Figures 1 and 2 about here

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in these diagrams, the output of each process (a problem solution or a choice among alternatives) can be viewed as the function of the same three input dimensions: the task environment, the individual's skills and predispositions, and the information accessible.

This review deals with each process separately and for what are believed legitimate reasons. The task requirements placed on individuals in problem and in decision situations are different. Each kind of situation places on individuals certain characteristic skill and information requirements. Therefore, the conditions for promoting and training problem solving differ from those for decision making.

The models and concepts and the relevant research are reviewed first

FIGURE I: COMPONENTS OF DECISION MAKING PROCESSES

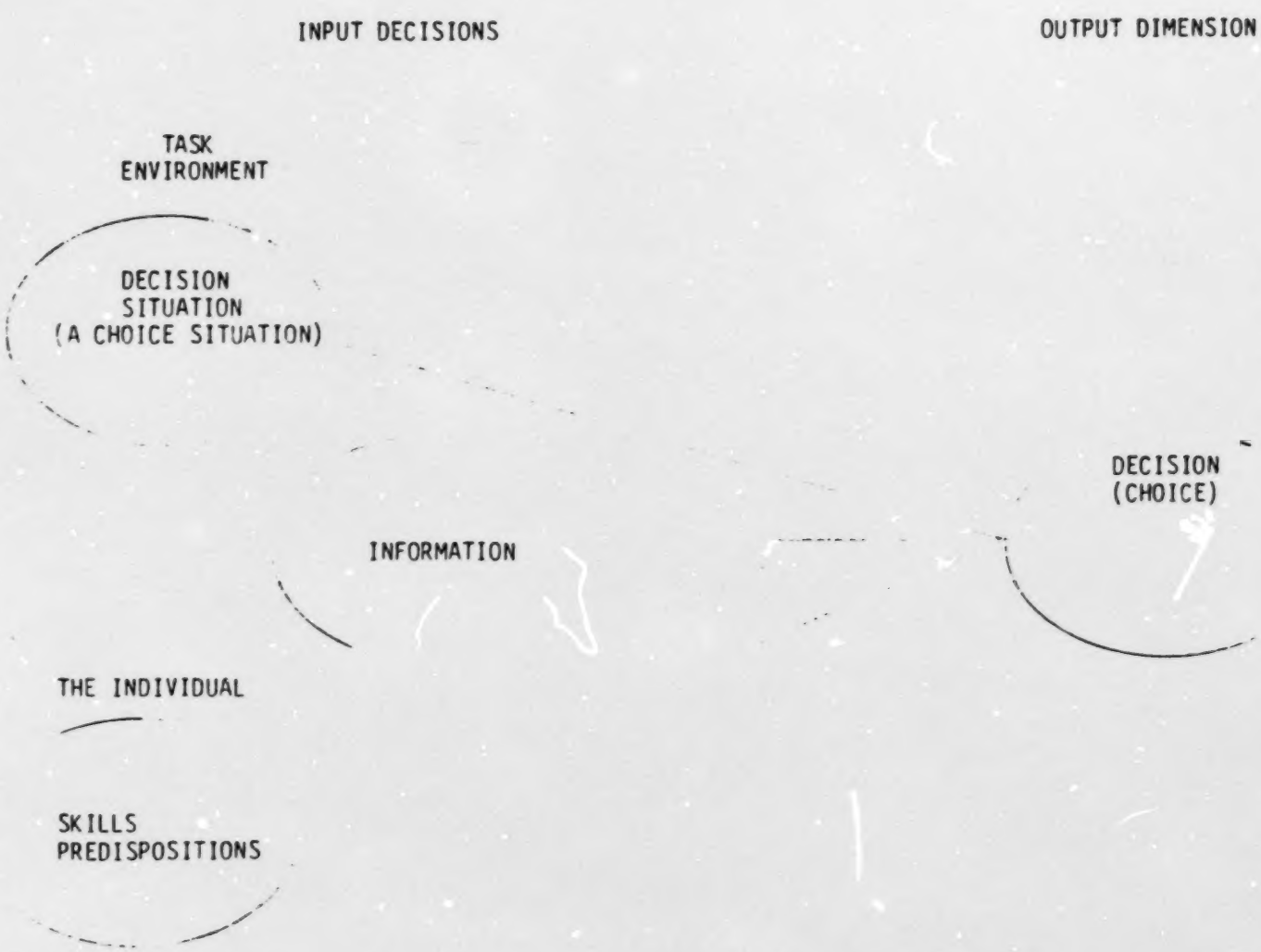

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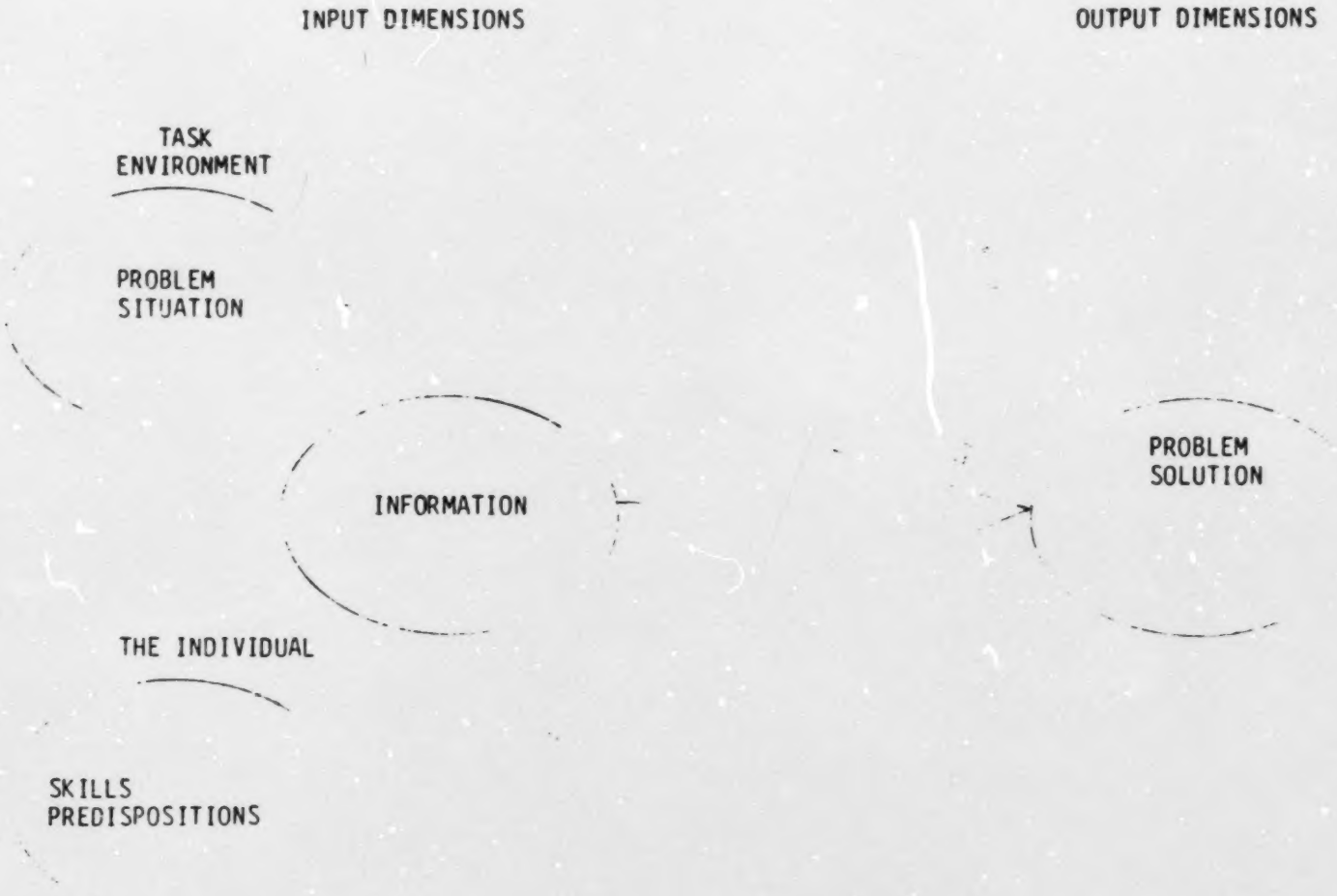
FIGURE 11: COMPONENTS OF PROBLEM SOLVING PROCESSES



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for problem solving and then for decision making. In a closing section, implications from the problem solving and decision making literature are discussed, especially as they may apply to programs designed to support students deciding on a major course of study and/or a vocational path.

The problem solving area is complex. The literature, while providing insights, is less than comprehensive and difficult to integrate. Because of the many kinds of problem situations (tasks) used for research purposes, the results and conclusions reported in studies must be examined carefully to determine the extent to which they can be generalized beyond the boundary conditions established within the studies themselves.

Models and Concepts

Heppner (1978) has described the two basic approaches to the area both of which continue to have their supporters. "On the one hand, investigators such as Gagne (1964) and Skinner (1974) have focused mainly on the past experience of the individual as the most important variable in problem solving. Other investigators (e.g., Kohler, 1925; Maier, 1970) have maintained that it is largely the individual's perception of the situation which is of utmost importance in solving a problem. Since the controversy began in the early 1900s many experiments have been performed in an attempt to clarify the crucial variables in the problem solving process. Although more is now known about problem solving, how people solve problems is still largely unknown." This same "major theoretical schism" is noted by Davis (1973); he devotes a chapter describing each concep ion, past experience and perception, from basically a historical perspec ive.

In a recent article Greeno (1978) has described the trends in problem solving. He notes that the behavioristic and associationistic traditions of experimental psychology have been largely abandoned, as have many of the past popular ways of studying problem solving behavior, e.g. anagrams, puzzles, and concept identification tasks (Bruner, et al., 1956).

With increasing frequency researchers are using and specifying detailed process models. Newell and Simon (1972) state ". . . psychological analyses of problem solving now attend to the nature and organization of component processes that interpret information, set goals, and select among actions in the process of solving the problem" (p. 15). Consistent with and part of this transformation to process models has been the use of increasingly complex and diverse tasks to study problem solving.

Whereas psychologists use models of processes and subprocesses to describe the underlying cognitive operations used in approaching a task, others have outlined a sequence of tasks using step models. Davis (1973) describing a number of such models observes that they are elaborations of a two-phase process: problem awareness and problem solution. For example, Koberg and Bagnall (1976) outline a seven stage model which can be divided into an awareness phase (accept situation, analyze, define) and a solution phase (ideate, select, implement, evaluate). An analysis of these and other models (e.g., Parnes, 1967; Crutchfield, 1969) reveals more similarities among the stages than differences and a universal inclusion of a problem awareness phase followed by a problem solution phase.

Greeno observes that most current work in the psychology of problem solving views problem solving as a search among sequences of operations. He describes a concept frequently inherent in problem solving models, means-end analysis. Greeno defines means-end analysis as ". . . a general heuristic used in organizing work on a problem. In means-end analysis, the problem solver compares the current situation with the goal situation to identify the differences between them. These differences become the focus of work on the problem, and the problem solver sets sub-goals of trying

reduce the various differences that are found" (p. 16). This analytical technique is consistent with the previously mentioned distinction found in most step models. Thus, identifying or defining differences between the current situation and the goal can be viewed as the critical step in the problem awareness phase. And, identifying the means and working towards meeting the subgoals can be described as the critical feature in the problem solution phase.

When discussing the extent to which problem solving capabilities are generalizable (or alternately, programs can make problem solving generalizable) two questions arise of interest to the practitioner. First, to what degree do problem strategies and solutions generalize to similar but different problems? Studies addressing this question are commonly termed transfer of training studies. Second, to what extent are problem solving skills retained and how reliable is the performance over time?

The literature on transfer of training is as an uneven and eclectic group of studies as those that make up the problem solving literature. While transfer of training studies are not reviewed here, it is useful to point out that some authors in the areas caution against the assumption of transfer to other tasks without actually testing that assumption out. After citing studies documenting the facilitative effects of procedures as they are applied in discrete problem situations (Davis, 1966; Bergen & Garfield, 1971; Krumholtz & Thorensen, 1976), Dixon et al.(1979) note that ". . . the generalizability of these solutions and the improved ability of clients to deal with future problem situations has not been empirically supported."

Newell and Simon (1972) propose that there may be insufficient reason

to assume intelligence is generalizable over different task domains, and that without positive results, the question of whether generic skills exist ". . . generally remains an empirical question, to be settled by evidence, not definition" (p. 84).

In contrast to the transfer of training issue, the question of retention of problem solving skills over time has at least been partially answered. Numerous studies have shown that while rules (strategies, procedures, algorithms, heuristics) are resistent to forgetting over periods of many months, people have demonstrated a significant loss of retention of information and facts beginning soon after acquisition (Ausubel, 1968; Gagne, 1970). Both skills and information are necessary for successful problem solving. Consequently, the degree to which the individual remains successful with a particular type of problem would seem to be a function of the initial success an individual has within the problem situation and the relative degree to which skills rather than information are necessary for the resolution of the problem.

A number of models and ideas are available to practitioners. Whereas cognitive process models and stage process models and such techniques as means-end analysis have intuitive appeal and provide a useful research framework, they remain only suggestive and do not by themselves provide sufficient direction to educators, counselors and the like.

Over the past twenty years, Gagne has consistently pointed to the importance of prior learnings and prerequisite skills for the successful performance in problem solving tasks. He (1970) describes a method, task analysis, by which the prerequisite skills, i.e., skills necessary for success, can be identified. He goes on to specify the different types of skills possible and the conditions by which they can be promoted. Using the task analysis method, one can better predict whether an individual with a particular set

of capabilities will or will not be successful with a given task, and more importantly, which skills should be developed to ensure success. Of special concern to educators would be those rules (strategies, procedures, algorithms, heuristics) and their underlying concepts which act as the important prerequisite capabilities for effective problem solving.

Whereas Gagne's method requires looking at each problem situation as a separate task for analysis, D'Zurrilla and Goldfried (1971) present a five-stage process model and then for each stage describe those types of generic skills necessary for successful problem solving and some general guidelines for their promotion. Heppner (1978) takes the same model and applies it to resolving personal problems and suggests types of counseling approaches which may be employed to promote the kinds of generic skills inherent at each stage.

Training

Educators, counselors, and other practitioners have been more concerned with improving problem solving capabilities than in engaging in psychological modeling or generating descriptive step models. The following sections describe some implications for training which follow from models and research associated with the past experience and the perception perspectives.

Past experience perspective and training. Those who view past experience as most critical, have examined ways of identifying what kinds of prior learnings are critical to a given problem situation and have suggested the conditions under which prerequisite capabilities can be brought about. Gagne and his associates among others have studied those capabilities important to quality problem solving. A number of studies have shown training in the

use of applicable problem solving strategies has improved problem solving performance, though the evidence is heavily weighted with problem solving in formal laboratory tasks (cf. Davis, 1966). Steve (1980) demonstrated that training in rule application, that is, using a strategy or algorithm, led to improved performance in two problem solving tasks. In addition, practice in rule selection, choosing the most appropriate rule for a particular class of problem situations, improved performance in these tasks.

The perception perspective and training. Changing the individual's perception of the situation (the thrust of the perceptual approach) has been associated with such problem solving techniques as attribute listing, morphological synthesis, idea listing, synectics (making analogies) and brainstorming (Davis, 1973). Except for brainstorming, these techniques lend themselves to solving problems by individuals working alone. The perceptual approach and techniques such as these are most related to the process of creating or discovering a novel response to a problem situation sometimes referred to as "creative problem solving".

What kinds of training experiences facilitate insightfulness and creative problem solving? What allowed C.C. Cannonball to arrive at his "insightful" solution? Study in this area has been difficult in large part because there is a lack of consensus on what creativeness is and how to measure it (Davis, 1973).

Summary. Many programs have been established to promote problem solving and many are reported in the literature. Feldhusen and Treffinger (1977) provide a useful guide and review to available instructional materials and books in the creative thinking and problem solving areas.

A wide range of problem solving strategies are taught in these programs and materials, among them, means-end analysis, goal setting, brainstorming, and using analogies.

Decision Making

Bross (1953) states that "decision-making is...the process of selecting one action from a number of alternative courses" (p. 1). This definition has received acceptance by management scientists, psychological researcher, and counselors. Janis and Mann (1977), Gelatt (1966) and others include two activities in the decision making process: a search and collection of information activity and an appraisal activity. Janis and Mann view the vigilant decision maker as "...searching for and deliberating about information concerning the alternatives open to him" (p. 14). The requirements for making a good decision according to Gelatt (1966), include a search for "adequate and relevant information" and "an effective strategy for organizing, analyzing and synthesizing the information in order to arrive at a choice" (p. 13).

Models and Concepts

In the study of decision making, three general approaches appear in the form of normative, dynamic, and descriptive models (Wilcox, 1972; D'Zurilla & Goldfried, 1971; Janis & Mann, 1977). Normative models prescribe sets of rules, many times represented as a mathematical equation, which supposedly allow a decision maker to select from a set an optimal alternative. Descriptive models describe how an individual or group actually goes about making a decision. Both normative and descriptive models represent the task environment (or decision space) as static and unchanging where the task is to select from among a set of fixed and definable alternatives.

In contrast, those opting for a dynamic approach view the task environment as somewhat unstable, and a function of how the individual views the situation

at a particular point in time. The process of making a decision, consequently, is seen as more complex and less static than a choice from among an externally determined set of alternatives. Subsequent sections describe more fully the three models, and discuss studies germane to each. A final section describes decision-conflict theory (Janis & Mann, 1977), a comprehensive treatment of available research which has interesting implications for programs designed to promote decision making.

Before turning to these sections, however, it is useful to note that authors in the decision making area avoid use of step or stage process models, so popular in the problem solving area. Janis and Mann (1977) represent the exception. They propose that an individual may have different concerns (questions) at different stages of making decision.

STAGE	KEY QUESTIONS
1. Appraising the Challenge	Are the risks serious if I don't change?
2. Surveying Alternativees	Is this (salient) alternative acceptable means for dealing with the challenge? Have I sufficiently surveyed the available alternatives?
3. Weighing Alternatives	Which alternative is best? Could the best alternative meet the essential requirements?
4. Deliberating about Commitment	Shall I implement the best alternative and allow others to know?
5. Adhering despite Negative Feedback	Are the risks serious if I don't change? Are the risks serious if I do change?

(p. 172)

Janis and Mann warn, however, that this five-stage sequence should not "...be taken as establishing an ironclad law that specifies the steps every decision must invariably go through" (p. 178). They stress that for both good and poor decision making patterns some steps may be perfunctory or omitted and that decision makers may spiral back to earlier phases at any point. The assumption that an individual's attention and psychological state will show shifts as that individual "moves through" a decision is a cornerstone of the decisional-conflict theory.

Normative models

Normative models were heavily represented in the literature during a period spanning the 1940s through the 1960s. The models have evolved from microeconomic theory and are heavily represented in studies based on utility theory (Wilcox, 1972; D'Zurilla and Goldfried, 1971). Psychologists incorporated and adapted some of these ideas into models of human decision making.

> Following the paradigm described by Edwards (1961), the expected utility of any alternative may be arrived at by a joint consideration of the value of each outcome, as well as by the likelihood that the alternative will result in achieving this outcome. The utility model which most closely parallels human behavior in problematic situations is one which involves a subjective estimate of the probability that each particular alternative will achieve any given outcome, as well as subjective determination of the value of the various outcomes. Edwards has referred to this as the subjectively expected utility model of human choice (D'Zurilla & Goldfried, p. 18).

The normative approach remains a fixture in contemporary management decision theory and practice. Management science and operations research rely heavily on statistical methods and quantifiable data as well as linear and dynamic programming techniques, Monte Carlo and game theory models and

simulation models (Greenwood, 1969). While these techniques have definite worth when optimizing outcomes such as profit and utility, they have been criticized when applied to individual human decision making. Janis and Mann (1977) present a cogent summary of these criticisms.

> Specialists on organizational decision making desribe the optimizing strategy as having the goal of selecting the course of action with the highest payoff. Such a strategy requires estimating the comparative value of every viable alternative in terms of expected benefits and costs (see Young, 1966, pp. 138-47). But, as Herbert Simon (1976) has pointed out, human beings rarely adopt this decision-making approach: people simply do not have 'the wits to maximize' (p. xxviii). Part of the problem is that determining all the potentially favorable and unfavorable consequences of all the feasible courses of action would require the decision maker to processs so much information that impossible demancs would be made on his resources and mental capabilities. In his attempts to obtain the degree of knowledge needed to anticipate alternative outcomes, the decision maker is likely to be overwhelmed by 'information inundation, which can be quite as debilitating as information scarcity' (Miller and Starr, 1967, p. 62). Moreover, so many relevant variables may have to be taken into account that they cannot all be kept in mind at the same time. The number of crucially relevant categories usually far exceeds 7 ± 2, the limits of man's capacity for processing information in immediate memory (see Miller, 1956). Handicapped by the shortcomings of the human mind, the decision maker's attention, asserts Simon, 'shifts from one value to another with consequent shifts in preference' (p. 83). (p. 21-22).

Optimizing strategies may seem like an ideal approaches for decision makers. However, there remain serious questions whether individuals can effectively weigh and appraise the costs and benefits of available alternatives. Miller and Starr (1967) argue that it is difficult to quantify or even identify the kinds of values and the psychological and sociological forces at work on an individual in a decision situation. In addition, numerous studies shed doubts on the assumption that individuals can successfully process or retain substantial amounts of information. Some studies relating to the question of information collecting and use are reviewed in the next section "Descriptive Approaches".

Descriptive Approaches

Whereas normative approaches lead to suggestions of how individuals should act to make quality decisions, descriptive approaches take a step back and ask how individuals do act making decisions. The approach, more empirical in its orientation, invites research studies rather than casting doubt on their necessity. Studies examine the relationships among the inputs (information, choices, personalogical characteristics, etc.) and the output. A number of studies have investigated the effects of information on resulting decision making behaviors.

A good decision requires adequate and relevant information as it relates to possible alternative actions, possible outcomes, the probability of outcomes, and the desirability of outcomes and their consequences (Gelatt, 1966). With some interesting exceptions, studies have shown that people with low to medium amounts of information to process make effective decisions and remain continuously open to new and relevant information.

Lanzetta and Driscoll (1968) studied the joint effects of uncertainty and importance on information search. They found that search increased in conditions promising greater gains and in conditions, promising greater losses. Search also increased in conditions of greater uncertainty. Post-hoc analysis suggested that the effects of importance and uncertainty were additive. Also, importance effects were in part mediated by uncertainty, i.e., the more important a decision, the more uncertainty was created. Corman (1957) reported that success in problem solving increased as the amount of information on how to attack a problem increased.

In a study which throws some doubts on the notion that people give attention to information regardless of its form, Borgida and Nisbett (1977) concluded that information is used in proportion to its vividness. They found that brief fact-to-face comments about undergraduate courses had a greater impact upon course selections than did printed course evaluations using ratings of students who previously had taken the courses.

A serious challenge to the notion that individuals act as open and unbiased decision makers has been the selective exposure hypothesis.

> The selective exposure hypothesis, regarded by an earlier generation of behavioral scientists as a fundamental tenet of social psychology, postulates that people generally censor their intake of messages in a highly biased way so as to protect their current beliefs and decisions from being attacked (see Klapper, 1949). A supplementary postulate is that people generally seek out communications that support their prior attitudes and decisions, especially when they inadvertently encounter negative feedback that makes them less confident. Thus, the selective exposure hypothesis asserts that people generally seek messages with which they agree and avoid those with which they disagree...the selective exposure hypothesis became a linchpin in various consistency theories (e.g., Festinger, 1957). Until the mid-1960s, deviations from the hypothesis were usually regarded as unimportant exceptions to the general rule, rather than as grounds for reconsidering it. (Janis and Mann, 1977, p. 203).

Freedman and Sears (1965) and Sears and Abeles (1969) reviewed numerous studies and, in seeming refutation to the selective exposure hypothesis, found that there were nearly as many studies indicating a preference for non- upportive information as for supportive information, and the most prevalent finding was "no preference".

> Nonconfirming studies show that a number of specific factors, such as the message's utility (Canon, 1964; Lowe and Steiner, 1968); ease of refutability (Lowin, 1967; Kleinhasselink and Edwards, 1975), topical interest and novelty (Atkin, 1973) can offset, if not swamp, whatever selectivity tendency there might be.

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Dynamic Approaches

As was stated previously, most descriptive and normative models assume a static decision space where the alternatives are finite and fixed. Furthermore, the models characterize the decision maker as one who attempts to use an optimizing strategy to find the "best" alternative against a background of personal trait characteristics, such as values, interests, etc. Those using a dynamic approach take pains to avoid making the assumptions which underly such charcterizations. For them, the decision situation or decision environment need not be static, and the individual decision maker may use different strategies and have different sets of internal influencers from situation to situation and from one time to another. The often observed and reported phenomena of vacilliation and the common occurrence of "changing one's mind" lend some credence to looking for something other than the rational and static world assumed in most decision making models.

The attempt to understand the information processing activities of the individual decision maker has been pioneered by Herbert Simon and his associates (Wilcox; 1972). To study how decisions are made, techniques which involve thinking aloud protocols and closely monitorng the information processing activities of individuals in complex and changing environments have been used. Attempts to model the individual problem solver using computer logic (Newell & Simon, 1971; Greeno, 1978) epresent a conplementary extension of this same approach in the problem solving literature.

If the individual does not use an optimizing strategy and a set of fixed personal values, what is the process? Simon believes that in most decisions, especially those in complex or changing environments, individuals employ

a "satisficing" strategy rather than an optimizing strategy. That is, they look for an alternative which meets or exceeds a set of minimal requirements which may or may not be influenced themselves as the search continues.

> Simon argues convincingly that the satisficing approach fits the limited information-processing capabilities of human beings. The world is peopled by creatures of 'bounded or limited rationality', he says, and these creatures constantly resort to gross simplifications when dealing with complex decision problems. Man's limited ability to foresee future consequences and to obtain information about the variety of available alternatives inclines him to settle for a barely 'acceptable' course of action that is 'better than the way things are now'. He is not inclined to collect information about all the complicated factors that might affect the outcome of his choice, to estimate probabilities, or to work out preference orderings for many different alternatives. He is content to rely on 'a drastically simplified model of the buzzing, blooming confusion that constitutes the real world' (Simon, 1976, p. xxix). (Janis & Mann, 1977, p. 26).

The arguments proposed by researchers and thinkers such as Simon pose serious problems for those desiring to build broadly generalizable decision making model as well as to those practitioners who are desiring one model which will generalize across situations, people, and time. Unfortunately, for practitioners, the dynamic approach, has produced little which can be used by those concerned with prediction and change. And furthermore, because of its reliance on simple and artificial tasks delivered in laboratory settings, dynamic approaches have missed the complex and emotional sides of decision making.

A Conflict Model of Decision-Making

Whereas individuals would appear to have an inclination to search out and use information effectively, they do not always. Why not? Three plausible explanations. First, as within problem solving situations, individuals can

fail because they do not possess the prerequisite skills to search out, recognize and use relevant information. This could be termed the "learning deficit" explanation. Second, in situations which are complex and the information requirements great, the individual's information processing capabilities are taxed beyond his or her abilities. The "biological limitations" explanation (or alternatively, the "Hey, I'm only human" explanation) has been described by Simon (1976). A third possible explanation of poor decision making involves the conflict individuals feel in decision situations with important consequences. This section concludes with an analysis of miscalculation under conditions of "decisional conflict".

The decisional-conflict model may be unique among all decision making and problem solving models. Janis and Mann are unwilling to assume as the standard the idealized behavior of a coldly rationale decision maker, as it is the standard implied in those using normative and most other descriptive approaches.

Instead they focus on an individual's cognitive functioning and psychological state during and after making a decision. In this way, there exists a meaningful similarity to writers and researchers who it could be said use a dynamic approach. On the other hand, the conflict model differs from those using a dynamic approach in critical ways. First, consistent with other descriptive models, the conflict model assumes a static decision space made up of a finite and fixed set of choice alternatives. Second, Janis and Mann sample from a wide range of psychological research and are less behavioristic in their approach and description. And third, they state that research results based

on artificial, laboratory tasks, one of the trademarks of those adopting a dynamic approach have questionable generalization to real life situations.

What is the conflict model? The model attempts to relate sets of antecedent conditions to sets of possible consequences and to specify the psychological constructs and processes which mediate the two.

> What is unique about the model is the specification of conditions relating to conflict, hope, and time pressure that mediate distinctive decisional coping patterns. Our claim is that the five coping patterns are linked dependably with the conditions we have specified, a claim that has testable implications about environmental circumstances that generate vigilance and about deliberate interventions that could counteract the beliefs and perceptions responsible for defective coping patterns. (p. 72)

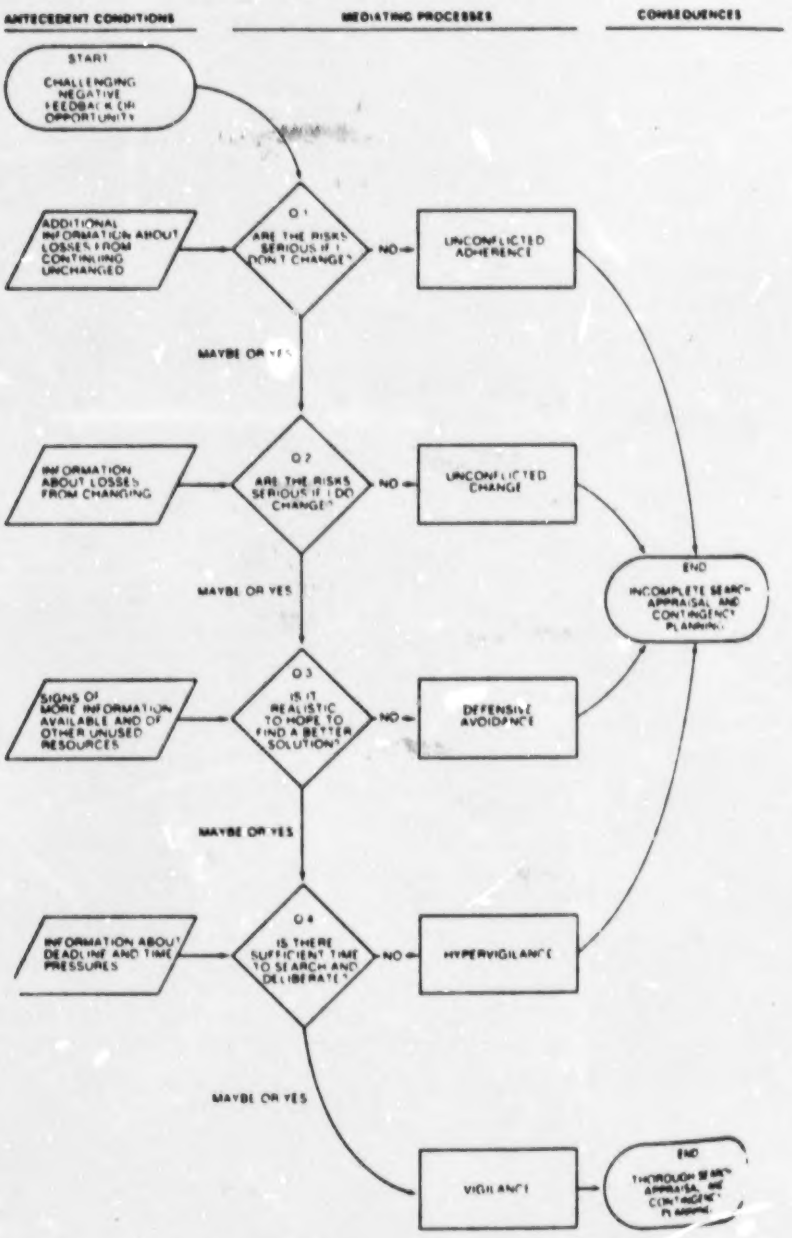
The theory involves a number of formulations. Those parts of the theory which are thought to have the most interest to practitioners are included in the following pages. The heart of the theory, a conflict-theory model of decision making, has been included in Figure 1.

Insert Figure 3 about here

According to this model, the decision maker who answers "yes" or "maybe" at each decision point in dealing with a consequential decision is prepared to carry through with those activities associated with high quality "vigilant" decision making.

> (The four "less-than-vigilant" patterns)...are occasionally adaptive in saving time, effort, and emotional wear and tear, especially for routine or minor decisions that do not have serious consequences. But they often result in defective decision making when the decision maker is confronted with a vital choice that has serious consequences

FIGURE 3. A conflict-theory model of decision making applicable to all consequential decisions.



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> for himself, for his family, or for the organization on whose behalf he is making the decision. These four patterns are: (1) unconflicted inertia; (2) unconflicted change to a new course of action; (3) defensive avoidance; and (4) hypervigilance. (p. 52)

The behavorial consequences of each of the five patterns are described in Table 1. Each pattern is analyzed against the seven criteria which it is maintained act as criteria for thorough search and appraisal activities.

Insert Table 1 about here

Table 2 extends the theory to the behavioral and psychological consequences of individuals who demonstrate each of the five decision making patterns.

Insert Table 2 about here

Together Figure 3 and Tables 1 and 2 outline the major components of the conflict theory model. It should be noted that Janis and Mann have rigorously reviewed studies which provide tests for the predictions inherent in these formulations. They have therefore been successful in integrating a large body of research investigating ways that people react and make decisions in conflict-inducing choice situations.

The authors emphasize that the theory is limited to decision situations which have serious consequences. Only in such conflict-inducing conditions, are the potentially debilitating psychological conditions present to impede quality decision making. Whereas other models imply that individuals can somehow control these psychological reactions and that individuals act in a cool and objective manner, Janis and Mann disagree with the contention.

TABLE 1 **Predecisional behavior characteristic of the five basic patterns of decision making.**

	Criteria for High-quality Decision Making							
	(1)	(2)	(3)		(4)	(5)	(6)	(7)
			CAREFUL EVALUATION OF CONSEQUENCES					
PATTERN OF COPING WITH CHALLENGE	THOROUGH CANVASSING OF ALTERNATIVES	THOROUGH CANVASSING OF OBJECTIVES	*a. of current policy*	*b. of alternative new policies*	THOROUGH SEARCH FOR INFORMATION	UNBIASED ASSIMILATION OF NEW INFORMATION	CAREFUL RE-EVALUATION OF CONSEQUENCES	THOROUGH PLANING FOR IMPLEMENTATION AND CONTINGENCIES
Unconflicted adherence	–	–	–	–	–	+	–	–
Unconflicted change	–	–	+	–	–	+	–	–
Defensive avoidance	–	–	–	–	–	–	–	–
Hypervigilance	–	–	±	±	±	–	–	–
Vigilance	+	+	+	+	+	+	+	+

KEY: + = The decision maker meets the criterion to the best of his ability.
– = The decision maker fails to meet the criterion.
± = The decision maker's performance fluctuates, sometimes meeting the criterion to the best of his ability and sometimes not.

All evaluative terms such as *thorough* and *unbiased* are to be understood as intrapersonal comparative assessments, relative to the person's highest possible level of cognitive performance.

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TABLE 2. **Manifestations of conflict and related symptoms of stress for each of the five basic patterns of decision making.**

PATTERN OF COPING WITH CHALLENGE	SUBJECTIVE BELIEFS (INDICATORS OF MEDIATING PSYCHOLOGICAL CONDITIONS SPECIFIED IN FIGURE 3-2)	LEVEL OF STRESS	DEGREE OF VACILLATION OF PREFERENCE FOR ALTERNATIVE COURSES OF ACTION
1. Unconflicted adherence	· No serious risk from current course of action	*Low*: persistently calm	No vacillation
2. Unconflicted change	· Serious risk from current course of action · No serious risk from new course of action	*Low*: persistently calm	No vacillation
3. Defensive avoidance	· Serious risk from current course of action · Serious risk from new course of action · No better solution can be found	*Variable* from low to high (predominantly pseudo-calm, with breakthrough of high emotional arousal when signs of threat become salient)	Little or no vacillation (except when signs of threat are salient)
4. Hypervigilance	· Serious risk from current course of action · Serious risk from new course of action · A better solution might be found · Insufficient time to search for and evaluate a better solution	*High*: persistently strong anxiety	Very high rate of vacillation, but occasionally practically none as a result of perseveration
5. Vigilance	· Serious risk from current course of action · Serious risk from new course of action · A better solution might be found · Sufficient time to search for and evaluate a better solution	*Moderate*: variations within intermediate range, with level depending upon exposure to threat cues or reassuring communications	Moderate to high rate of vacillation (depending on content of new information)

> Human beings, programmed as they are with emotions and unconscious motives as well as with cognitive abilities, seldom can approximate a state of detached affectlessness when making decisions that implicate their own vital interests or those of their organization or nation. (p. 72)

While such an assumption may appear pessimistic, it may also be realistic. Numerous studies demonstrate that individuals do not make decisions in a rationale and detached manner.

The decisional-conflict theory's formulations are convincing largely because of the weight of the research supporting them. These formulations stand alone in their potential for providing practitioners with a unified approach for diagnosing the decision making process. Whereas most other problem solving models view steps and stages as critical factors in information search and appraisal activities, the conflict position maintains that it is the coping pattern that is determining.

> Irrespective of the specific stage of the decision, the decision maker will be either indifferent, defensively avoidant, hypervigilant, or discriminately vigilant with respect to relevant information, depending upon the antecedent conditions determining his model of coping response. (p. 213)

Implications of this model, especially as they relate to the three maladaptive coping patterns mentioned above indifference--encompassing both unconflicted inertia and unconflicted change to a new course of action, defensive avoidance, and hypervigilance, will be discussed in the next section.

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IMPLICATIONS

In this section implications from the problem solving and decision making literature are discussed. The focus of this section are high school and college students who are deciding on a school to attend, a major course of study, an occupation, or a career path. Consequently, of special interest are vocational decision making models and studies. Some of these studies are introduced and discussed in this section. A primary question which this section addresses is, "What types of interventions (programs) can provide assistance and support to students as they make decisions related to vocational choices."

While many writers take care to distinguish among "career decision making", "vocational decision making", and "choosing a major", this section uses the single term "vocational decision making". This is not to imply that there aren't purposes served by distinguishing among these terms. Rather it is a recognition that the decisions implied in these areas have many crucial similarities. There exists a strong relationship among the sets of options available when selecting a major, a graduate school, a first job, an occupation, etc. The inputs into making these various decisions (eg., the values and interests of the individual, vocational information, etc.) are also in large part similar in nature.

This section presents eleven guidelines. It is believed that these guidelines have application to various kinds of programs, i.e., any kind of intervention. Among programs which could be impacted are those designed 1) to instruct students in skills important to making vocational decisions

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(educational programs), 2) to assist and support students with vocational decisions (e.g. career counseling programs), and 3) to assist students with personal and interpersonal problems and decisions (e.g. life skills programs).

Studies which support the first two guidelines were reviewed and describe in the problem solving review section.

1. Prior learning is critical to success in a problem situation. A task analysis provides a method for identifying necessary prerequisite skills.

2. The questions of whether general problem solving skills exist or whether an individual's success in one situation can transfer to another situation are empirical in nature and should be so treated.

A task analysis procedure (Gagne, 1970) can facilitate identification of skills necessary for successful problem solving and decision making. An individual's skill level can be assessed or assumed and instructional interventions provided to meet skill deficits identified or assumed. Such a procedure is successful with a specific, limited "task" situation. Consequently, for the procedure to have a reliable payoff, efforts need to be made to identify rather precisely the kinds of problems and decisions with which students must deal, and the skill requirements implied within each problem decision situation.

The studies reviewed fail to offer much support to the conclusion that general problem solving or decision making models are useful. (These models do, however, have some value as descriptive vehicles.) Identification of

a set of principles which help define the degree to which transfer of skills can be expected from one situation to another or the conditions under which such transfer could be expected were beyond the scope of this review. Without such guidance, the practitioner would seem wise to adopt the following strategy: 1) Identify important problem and decision situations for which student success is deemed critical; 2) Use a task analysis procedure (or other procedure(s)) to identify the skills necessary for success in each of these situations; 3) Develop/modify programs; 4) Implement the program and establish within it methods by which it can be determined if transfer of training is occurring. This last recommendation addresses the fact that while general problem solving/decision making skills may exist and/or transfer of training may occur, it is less costly to test the assumptions inherent in such acceptance than not to test them.

No program can deal with all difficult situations students face but it seems a prudent course would involve equipping students with the necessary skills to resolve the more critical problems and to act vigilantly in important decisions areas such as choice of major and choice of occupation. The evidence is not available that instruction in how to understand and use "all-purpose" problem solving and decision making models will be sufficient in promoting skills applicable to different kinds of problem situations or meet the specific learning requirements in specific problem/decision situations.

3. Individuals are biologically limited information processors.

Studies have revealed that people can maintain no more than five to nine "chunks" of information active in immediate memory at any one time.

Furthermore, human subjects have shown to be limited to storing one chunk of information in long-term memory every seven or eight seconds. Such limitations have implications for success in complex problem and decision situations where the information requirements are great as could be expected in situations involving choosing a vocation, a city in which to live, or a mate.

What are the implications for a program? For any important student decision, a program designed for facilitating decision making may want to consider the following: the type of information required in the decision, the availability of that information, the presentation form of the information which students may need, and strategies to insure that the information is accessible at the time the decision is made. An example will demonstrate how these considerations (criteria) could apply to a common decision situation, i.e., students facing a choice among various majors. One kind of information which may be useful in this situation is the satisfaction of students already in those majors. Assume that a program conducted a survey assessing student satisfaction within available majors and summarized this information in an easy-to-read chart and distributed the chart to all students.

Is the information useful/relevant?	Potentially.
Was the information available to students without the program securing it?	No, they probably have neither the skills, the time, nor the access.
Is the information summarized in an economic fashion?	Yes, in chart form.
Will the information be accessible at the time of making the decision?	Because it cannot be assumed that so much information can be remembered (accessible when needed), the chart can be referred to as needed.

Applying these four criteria during development of programs can compensate for students' limitations to gather, process, and use information.

The decisional-conflict model (Janis & Mann, 1977) specifies three different defensive coping patterns -- indifference, hypervigilance, and defensive avoidance -- each linked dependably to a set of antecedent conditions and as set of behavorial consequences. By recognizing the behavioral manifestations of each pattern, a program may be able to intervene 1) to change the perceptions and beliefs internal to the decision maker and/or 2) to modify the external environment to better support a vigilant coping pattern. The three defensive coping patterns are discussed, in terms of ther antecedent conditions, their consequences, and implications these have for a program.

4. Programs can be designed to meet the coping pattern of indifference.

Antecedents. The authors summarize the antecedents as an individual's "...belief that no serious risks are involved from pursuing the current course or from adopting a new course of action..." (p. 205)

Consequences. They are described as:

1. Not a careful search of information.
2. Not a careful appraisal of information.
3. Unbiased indifference to supportive and non-supportive information.
4. Low level of stress (no conflict either staying with the current course of action or changing to a new course).
5. No vacillation.

Program implications According to the theory, the coping pattern of indifference may be appropriate, as with routine decisions, e.g., should

I buy mayonaise or salad dressing. However, with some major kinds of decisions one might be suspicious if an indifference pattern were manifest. If students in a decision situation having major consequences (for example, selecting a major course of study) exhibit the symptoms of the indifference coping pattern, one might wonder if the decision one made would continue to be an acceptable one as time went on or as new information were presented and assimilated.

Changes to internal perceptions and beliefs. Interventions could be directed to informing students about real and possible consequences of accepting any course of action without scrutiny. In addition, techniques to increase emotional arousal may have benefits. For example, observing the consequences to others who failed to take the decision as a consequential one, may lead students to a more thorough search and appraisal process. Janis and Mann cite a number of studies studying the facilitating and debilitating effects of strong warning appeals. They conclude that in fear arousal studies, both factors are at work, and that it is difficult to predict under what conditions and with which individuals the facilitating effects of arousal evoked by warnings are overpowered by the interfering effects.

Changes to the external environment. Perhaps the individual cannot see the importance of the decision because of factors beyond the program's control, e.g., maturity, lack of commitment to the alternatives available, etc. Whatever the reason, these individuals may at a later time see the importance of the decision and regret the decision they made. Thus, for some individuals, it may be necessary to build flexibility into the decision environment allowing trying out different alternatives and changing one's mind.

5. Programs can be designed to meet the coping pattern of hypervigilance.

Antecedents

Hypervigilance is said to arise when there is the perception of insufficient time to make a decision. While Janis and Mann cite many studies in which individuals react to conditions in a panic-like state, most of these studies observed peoples' reactions to disaster situations.

> Perhaps the relative infrequency of hypervigilant reactions is attributable to the rarity of the prime antecedent conditions that we postulate for the appearance of this pattern -- namely, awareness of imminent danger of serious loss with moderate or high hope that it can be escaped baut with a very short deadline because but apparently adequate escape routes appear to be rapidly closing off. (p. 81)

It does seem possible, however, that the perceptual state of the indi-vidual is the important factor, and what may be viewed as a small thing to one can have "disastrous" proportions to another. And without sufficient time, or the perception of it, the hypervigilance pattern many occur.

Consequences

In brief, Janis and Mann describe hypervigilance as the "...impulsive commitment to the leact objectionable alternative in a state of acute anxiety about a rapidly approaching deadline" (p. 199). The consequences of hypervigilance can be summarized as involving:

1. Not a careful appraisal of information, alternatives, consequences.
2. "Active search for both supportive and non-supportive information, with failure to discriminate between relevant and irrelevant, trustworthy and untrustworthy." (p. 206)
3. Persistently high level of anxiety.

4. "Very high rate of vacillation, but occasionally practically none as a result of perseveration. (p.78)

5. Post decisional conflict over a choice is made.

One reliable consequence of this coping pattern is a large degree of what Janis and Mann describe as "postdecisional conflict" because the individual "...is likely to search frantically for a solution, persevere in his thinking about a limited number of alternatives, and then latch onto a hastily contrived solution that seems to promise immediate relief..." (p. 151). It is proposed that because of postdecisional conflict, individuals will be uneasy about their decision, and many eventually will undo or reverse it.

Program implications

Changes to internal perception and beliefs. Some individuals may be more susceptible to the hypervigilant state. Perhaps individuals who could be described as "high-anxious" as measured by trait anxiety measures are more prone to resorting to the hypervigilant pattern. This possibility, however, is little more than speculation.

Changes to the external environment. If it can be assumed that the time-pressures are in some sense "real" and not traceable to an individual's perception, then the program has some options, among them:

1. Allow more time. For example, if students are required to select a major by the beginning of their sophomore year, consideration can be gien to 1) creating an "undecided" option, which would effectively postpone the decision for selecting a major, 2) permitting students to "drop out" of school for a period of time and re-enter

when they indicate they are prepared to make a decision, and 3) changing the program so that students can postpone their final decision, for example, to the beginning of the junior year.

2. Create a program which has provisions for individuals to change their mind. Such a consideration was described earlier.

6. Programs can be designed to meet the coping pattern of defensive avoidance.

Antecedents

The determinants of the defensive avoidance reaction involve "...an awareness of serious losses from any alternative that might be selected, together with loss of hope of finding a satisfactory solution. (p. 205)

Consequences

Manifestations of the defensive avoidance coping pattern are said to include:

1. Not a thorough search for information.
2. Not a careful appraisal of information, alternatives, and consequences.
3. Passive interest or active search for supportive interest; avoidance of challenging and/or discrepant information.
4. "'Variable' from low to high (predominantly pseudo-calm, with breakthrough of high emotional arousal wh n signs of threat become salient)" (p. 78)
5. Little or no vacillation (except when perception of imminent threat).
6. Postdecisional conflict once a choice is made.

Defensive avoidance may take on one of three characteristic forms -- procrastination, shifting responsibility, or bolstering.

> The form of avoidance adopted depends partly on personality predispositions, but situational variables are nevertheless among the major determinants. When the two essential conditions of defensive avoidance (high conflict and loss of hope for a better solution) are present, information or advice that induces the decision maker to expect no serious penalties for postponing his decision will encourage the tendency toward defensive procrastination: he will stop thinking abut the issue, avoid discussing it with anyone who is interested in the outcome of his deliberations, and stay away from social situations where he might be put under pressure to make up his mind. But if he knows that there is a tight deadline with strong penalties for postponement, the decision maker's defensive avoidance tendencies are more likely to take the form of either shifting responsibility or bolstering. If the former, he directs his thoughts and actions toward getting others involved, rationalizing why they, not he, should make the decision and why they, not he, should take the blame if it turns out badly. If defensive avoidance takes the form of bolstering, the decision maker will continue to think and talk about the conflictful issue but will ward off stress by selective attention and distorted information processing. All three forms of defensive avoidance enable the decision maker to escape from worrying about the decision by not exposing himself to cues that evoke awareness of anticipated losses. (p. 87)

Program implications

When individuals are faced with making vital decisions, the defensive avoidance reaction "...is probably the most pervasive defective pattern as well as the most difficult to prevent or correct."

Changes to internal perceptions and beliefs. Janis and Mann refer to many types of interventions and they are difficult to summarize. Among them, though, they point out the role a counselor can play. It is suggested that the counselor "...try to counteract this pessimistic expectation in order to prevent 'defensive avoidance'."

> The counselor might encourage the client to discuss his dilemma with respected individuals in his personal network of relatives, friends, or mentors who might give him new perspectives and help him to maintain hope. He can also suggest that more information is available and tell the client where he might find it by mentioning pertinent books, pamphlets, and articles or by

> recommending professional experts who could be consulted. Above all, the decision counselor can himself convey a sense of optimism about the client's chances of finding a good solution to the problem.(p.374)

Janis and Mann belive that information can play an important role, however, it would appear that such information might be more effective if presented or available before the need to make a decision was imminent. If, in fact, "cognitive defenses are fostered by ambiguities and uncertanties in the information available to the decision maker concerning the consequences of alternative courses of actions." (p 94), the right kind of information may prevent the defensive aviodance reaction from occurring.

Changes to external environment. As was implied above, the defensive avoidance pattern may persist in a decision situation unless the hopelessness within the individual decision maker is addressed. Simple program modifications may be ineffectual.

Two considerations recommend themselves -- the same recommended to accommodate students who adopt a hypervigilant coping pattern.

1. Allow more time. Theoretically, this would serve at least two purposes. First, it would allow more time for individuals to be open to new information before the defensive avoidance pattern establishes itself and limits and biases the search. Second, if a choice is made and postdecisional conflict results, the individual, "especially if his dominant coping patterns is vigilance...will watch for an opportunity to work out a compromise solution that reduces the stress of post-decisional conflict..." As mentioned previously, a program can offer more time by creating an "undecided" option, allowing students to drop-out for a time, and changing

the timeline so students need not make the decision until later in their school career.

2. Build in a flexibility and thus accommodate individuals who change their mind. It is maintained that an individual who adopts a defen sive avoidance coping pattern and then selects an alternative will not be comfortable with that choice (suffer "postdecisional conflic which may lead to reversing the decision.

The program implications described for all three coping patterns are speculative. Most speculative are the prescriptive hypotheses for dealing with the defensive avoidance pattern. The descriptive power of the Janis and Mann's analysis, however, is persuasive. Programs would do well to consider doing "something" if students exhibit characteristics associated with each defective coping pattern. Failing to recognize manifestations of defective decision making will serve neither the student nor the program.

The next four guidelines offer some direction to practitioners as they consider how individual differences relate to vocational decision making.

7. A wide range of personalogical constructs have been investigated, however, the development of alternative interventions for different kinds of students as measured by instruments currently available is probably unwarranted.

It seems a tenable assumption that students approach vocational decision making in different ways. It is certainly true that individuals make differe decisions. The research which has attempted to identify personalogical constr

which reliably relate to the processes and products of vocational decision making has not had the successes that many have speculated. Studies in the vocational decision making area have investigated a wide array of constructs, among them, conceptual level (Streufert, 1975), cognitive complexity (Bodden and Klein, 1972), vocational self-concept (O'Hara and Tiedeman, 1959), risk (Ziller, 1957), intelligence (Hollender, 1971), Holland's personality types (Cain, Gilligan and Campbell, 1978), achievement (Dilley, 1965), sex role self-concept (Moreland et al., 1979), career maturity (Super and Thompson, 1979). An effort to use differential curricula based on these constructs appears premature given the state of the art.

8. Practitioners should continue asking themselves, "What is the legitimate and appropriate role of paper-pencil inventories?"

Dolliver (1969) reviewed a number of studies which investigated the relative efficacy of expressed and inventoried measurement modes. He found that for studies examining expressed interests and inventoried interests as measured by the Strong Vocational Interest Blank, that the predictive validity of expressed interest was at least as great as the predictive validity of inventoried interests. It is conceivable, however, that not all students are able to express a choice, and for these, inventories assessing interests, values, etc. may be helpful.

Borgen and Seling (1978) examined the realtive utility of expressed and inventoried interests when both were used together to predict college major and career choice outcomes. A longitudinal design was used measuring expressed and inventoried interest among more than 600 individuals before

college and three (3) years later. The following summary represents the most important outcomes.

> The total percentage of accurate expressed choice predictions was over 50% for both outcomes, while the Strong Vocational Interest Blank, Men's Form (SVIB-M) was accurate for 30.8% of all college major predictions and 40.2% of all career field forecasts. When expressed choice and the SVIB agreed in prediction of outcome, the hit rate rose to over 70%. However, when expressed choice and SVIB predictions were not the same for a given person, expressed choice was found to be 2-3 times more accurate than the SVIB-M.

Such results demonstrate that in certain situations the consistency (or alternatively, the lack of it) among inventoried and expressed interest profiles can have more predictive worth than either one by itself. The notion that "patterns" of behaviors (whether they involve scores, actions, choices, etc.) may be more useful than single behaviors has not received much research attention and may be a fruitful line of ivestigation.

9. Reliable differences between students who are decided and who are undecided about a vocational goal have not been discovered and reported. However, differential programs designed to meet the special needs of "indecisive" students may prove a most cost-effective approach.

Holland and Holland (1977) summarize the literature:

> Attempts to comprehend the vocational decisiveness of some students and the indecisiveness of others are characterized by conflicting findings, negative findings, or negligible findings. Although vocationally decided and undecided students have been assessed in many ways and with a vast range of variables (Ashby, Wall, & Osipow, 1966: Baird, 1968, 1969; Elton & Rose, 1971; Holland & nichols, 1964; Lunneborg, 1975; Nelson & Nelson, 1940; Osipow, Carney, & Barak, 1976), few clear or compelling differences emerg. Instead the most striking outcomes of these studeis are that decided and undecided high school and college students are much more alike

than different and that the relatively few differences found are conflicting and confusing. (p. 404).

They examine the practical applications of research in the area and speculate that:

> It is probably a mistake to treat all undecided students as if they had the indecisive disposition. Only a very small percentage could be expected to have such characteristics to an incapacitating degree. In terms of the evidence, it is more reasonable to assume that most undecided students do not have any special negative characteristics and to treat them accordingly. (p. 413)

In another article, Holland (1977) contends that not all students need the same kind and same intensity of intervention. He states that the development of diagnostic measures and alternative treatments represents a direction which better serves the differential needs of students and the limited resources of programs. The chart which follows was compiled and adapted from Holland's categorization of students and the types of intervention compatible for each type.

Student type	% of student body	Student Characteristics	Type of Intervention
Decisive	50%	Do not need or want assistance	Simple, inexpensive informational materials about jobs and training.
Exoloratory	30%	Have failed to make culturally epproved decisions near the specified times.	More complex and expensive self-and-vocational-exploratory services, large group activities, tests, and inventories, courses.
Somewhat indecisive	15%	Evidence of lack of some decisive characteristics	More complex, long term and expensive small group or training experiences.
Severly indecisive	5%	Unusual difficulty in planning and training for a carreer --especially at the standard expected rate.	Some or all of the above plus long term group and/or individual vocational-personal counseling.

This categorization scheme represents but one approach to structuring an intervention program. The categories and especially the percentages should be viewed as speculative. The chart is included here to serve primarily as an example of how a differentiated program could be conceived to meet the different needs which may exist within a student body.

In a rencent study, Slaney (1980 analyzed college students' respnses to the Occupational Alterntives Question (QAQ. The QAQ measure involves only two questions and responses to these were used to divide students into four groups-- those having an occupational first choice and alterntives, a first choice plus alternatives, no first choice but alternatives, and neither a first choice nor alternatives.

> The hypothesis tested was that these groups would differ on dependent variables related to vocational decision making. No significant differences were found on socioeconomic status or on Holland's constructs of consistency, differentiation, or congruence with career choice. Significant group differences were found on congruence with college major, total number of Vocational Preference Inventory responses, and scales measuring satisfaction with college major and career choice. Significant differences were also found on two recent scales measuring vocational indecision, that is, the Vocational Decision Making Difficulty Scale and the Career Decision Scale. (p. 122)

The author concludes that the "...results suggest that expressed choice, as delineated, has a useful degree of concurrent validity with other measures of vocational indecision, in addition to its previously demonstrated predictive validity." (p. 126). This study, together withe the results previously cited, demonstrates that measurements of expressed choice represent a meaningful and useful methodology. However, unlike other studies examining expressed choice, ue of the QAQ index is used to discriminate levels of decisiveness, and therefore, this measure, or other similar measures of expressed choice, may be useful in identifying students with differential needs.

10. There is some evidence indicating that vocational decision making is influenced by developmental processes.

Brown (1970) makes this point in his review and critique of the vocational decision making literature. With the growing emphasis on career development in the early and middle school years, models like the ones described by Ginzberg et al., (1953) and Super (1957) have been widely cited. Tiedeman and O'Hara (1963) present an interesting model which hypotheses the four stages (Exploration, Crystallization, Choice, and Clarification) individuals pass through when making a vocational choice. Harren (1966) tested the assumption that individuals may be at different stages at different times. Factor analyses of college students responses to a Q-sort task yielded some support for the idea that stages such as the four in the model do exist and that they exist inthe hypotheszied sequence.

11. Given the state of the art, programs should build in mechanisms to <u>assess</u> the effects of intervention options.

The previous ten guidelines represent different directions for practitioners (educators, counselors, etc.) to consider as they are designing programs and dealing with students. This last guideline is a recommendation fort the way in which these guidelines and other ideas can and should be implemented they will work and work well.

The other guidelines contain or address provisions which are speculative, and thus, require further testing either in a research or evaluation mode.

Skill transfer and the degree to which problem solving skills can be generalized should be tested (Guideline 2), which means assessing skills both in the environments in which they are taught and in which they are ultimately used. Consequently, programs need to establish the means by which students' success in related and unrelated task environments is assessed, recorded and analyzed.

Similarly, Guidelines 4, 5 and 6 should not be implemented without some follow-up assessments. Even though there exists a significant amount of research to indicate that different identifiable coping patterns exist, the utility and comparative benefits of using this approach needs investigation.

In conclusion, given the state of the art in the problem solving and decision making areas, practitioners may find the "let's try it out and test it" approach the one which bears the sweetest fruit.

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